

9-13 RIPRAP, QUARRY SPALLS, SLOPE PROTECTION, AND ROCK WALLS

Riprap shall consist of broken stone, broken concrete rubble, or concrete in sacks. Quarry spalls shall consist of broken stone or broken concrete rubble. Riprap and quarry spalls consisting of broken stone or concrete rubble shall be free from segregation, seams, cracks, and other defects tending to destroy its resistance to weather and shall conform to the following requirements for quality.

Aggregate Property	Test method	Requirement
Degradation Factor	WSDOT T 113	15 minimum
Los Angeles Wear, 500 Rev.	AASHTO T 96	50% maximum
Specific Gravity	AASHTO T 85	2.55 minimum

9-13.1 Loose Riprap

Loose riprap shall be free of rock fines, soil, or other extraneous material.

Should the riprap contain insufficient spalls, as defined in Section 9-13.6, the Contractor shall furnish and place supplementary spall material from a source approved by the Engineer, at the Contractor's expense.

The grading of the riprap shall be determined by the Engineer by visual inspection of the load before it is dumped into place, or, if so ordered by the Engineer, by dumping individual loads on a flat surface and sorting and measuring the individual rocks contained in the load.

9-13.1(1) Heavy Loose Riprap

Heavy loose riprap shall meet the following requirements for grading:

	Minimum Size	Maximum Size
40% to 90%	1 ton (½ cubic yd.)	
70% to 90%	300 lbs. (2 cu. ft.)	
10% to 30%	3-inch	50 lbs. (spalls)

9-13.1(2) Light Loose Riprap

Light loose riprap shall meet the following requirements for grading:

	Size Range	Maximum Size
20% to 90%	300 lbs. to 1 ton (2 cu. ft. to ½ cu. yd.)	
15% to 80%	50 lbs. to 1 ton (⅓ cu. ft. to ½ cu. yd.)	
10% to 20%	3-inch	50 lbs. (spalls)

9-13.2 Hand Placed Riprap

Hand placed riprap shall be as nearly rectangular as possible, 60 percent shall have a volume of not less than 1 cubic foot. No stone shall be used which is less than 6-inches thick, nor which does not extend through the wall.

9-13.3 Sack Riprap

Sack riprap shall consist of concrete placed in sacks made of at least 10-ounce burlap and having a capacity of approximately 2.5 cubic feet. Each sack shall be filled with approximately 1 cubic foot of concrete having a consistency in conformance with Section 6-02.3(4)C for nonvibrated concrete.

Concrete for sack riprap exposed to fresh water and salt water shall be Class 3000 as specified in Section 6-02.3.

The cement and fine and coarse aggregates shall conform to the requirements for cement and fine and coarse aggregate of Sections 9-01 and 9-03.1, respectively.

9-13.4 Vacant**9-13.5 Concrete Slope Protection**

Concrete slope protection shall consist of reinforced Portland cement concrete poured or pneumatically placed upon the slope with a rustication joint pattern or semi-open concrete masonry units placed upon the slope closely adjoining each other.

9-13.5(1) Semi-Open Concrete Masonry Units Slope Protection

Precast cement concrete blocks shall conform to the requirements of ASTM C 90.

9-13.5(2) Poured Portland Cement Concrete Slope Protection

Cement concrete for poured concrete slope protection shall be commercial concrete in conformance with Section 6-02.3(2)B.

9-13.5(3) Pneumatically Placed Portland Cement Concrete Slope Protection

Cement: This material shall be Portland cement as specified in Section 9-01.

Aggregate: This material shall meet the requirements for fine aggregate as specified in Section 9-03.1. The moisture content of the fine aggregate at the time of use shall be between 3 percent and 6 percent by weight.

Reinforcement: Wire mesh reinforcement shall conform to the provisions of Section 9-07.7.

Water: Water shall conform to the provisions of Section 9-25.1.

9-13.6 Quarry Spalls

Quarry spalls shall meet the following requirements for grading:

Sieve Size	Percent Passing
8"	100
3"	40 max.
3/4"	10 max.

9-13.7 Rock for Rock Wall**9-13.7(1) Rock for Rock Walls and Chinking Material**

Rock for rock walls and chinking material shall be hard, sound and durable material, free from seams, cracks, and other defects tending to destroy its resistance to weather, and shall meet the following minimum requirements:

Test	Test Method	Requirements
Specific Gravity	AASHTO T-85	2.55 min.
LA Wear	AASHTO T-96	50% max.
Degradation	WSDOT 113	15 min.
Absorption	AASHTO T-85	3% max.

Rock for rock wall sizes are approximately as follows:

Rock Size	Rock Weight (lbs.)	Average Dimension (in.)
One Man	50 - 200	12 - 18
Two Man	200 - 700	18 - 28
Three Man	700 - 2,000	28 - 36
Four Man	2,000 - 4,000	36 - 48
Five Man	4,000 - 6,000	48 - 54
Six Man	6,000 - 8,000	54 - 60

Chinking material shall be a minimum of 4-inches average dimension.

9-13.7(2) Backfill for Rock Wall

Backfill for rock walls shall be shot rock ranging in size from a minimum of 2-inches to a maximum of 6-inches.

Acceptance shall be based on visual inspection by the Engineer.